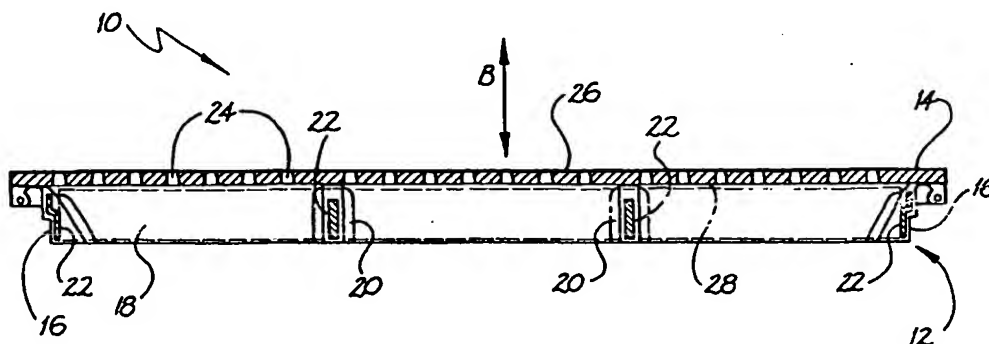




INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<p>(51) International Patent Classification ⁷ : B07B 1/46, 1/04, 1/34</p>	<p>A1</p>	<p>(11) International Publication Number: WO 00/66281 (43) International Publication Date: 9 November 2000 (09.11.00)</p>
<p>(21) International Application Number: PCT/AU00/00400 (22) International Filing Date: 1 May 2000 (01.05.00) (30) Priority Data: PQ 0129 3 May 1999 (03.05.99) AU (71) Applicant (for all designated States except US): USF JOHNSON SCREENS PTY LTD [AU/AU]; Macquarie Road, Warners Bay, NSW 2282 (AU). (72) Inventor; and (75) Inventor/Applicant (for US only): OLSEN, Peter, Martin [AU/AU]; 200 Brighton Avenue, Toronto, NSW 2291 (AU). (74) Agent: F B RICE & CO; 605 Darling Street, Balmain, NSW 2041 (AU).</p>		<p>(81) Designated States: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).</p> <p>Published With international search report.</p>

(54) Title: SCREENING EQUIPMENT



(57) Abstract

A screening panel assembly (10) includes a frame (12) on which a screening panel (14) is supported. The frame (12) has frame members and intermediate members with the panel (14) being secured only to the frame members of the frame (12).

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"SCREENING EQUIPMENT"

Field of the Invention

This invention relates to screening equipment. More particularly, the invention relates to a screening panel assembly and to a component for a
5 screening panel assembly.

Summary of the Invention

According to a first aspect of the invention, there is provided a screening panel assembly which includes

a support structure having a plurality of support members; and
10 a screening panel having a plurality of openings defined through it, the openings being of a size which determines a discriminating capacity of the panel and the panel being secured only to certain of the support members of the support structure to facilitate flexing of the panel in a direction normal to a plane of the panel.

15 Normally, in use, the screening panel assembly is arranged substantially horizontally and material to be screened flows over the panel of the assembly.

The support structure may include a frame having a pair of transversely spaced, longitudinal support members (when viewed in a direction of flow of the material over the panel assembly), a pair of longitudinally spaced,
20 transverse support members and a plurality of intermediate support members arranged between the longitudinal support members and the transverse support members. Preferably, the intermediate support members extend parallel to the longitudinal members, between the transverse members.

The panel may be secured to at least one of the pair of longitudinal
25 support members and transverse support members but is unsecured with respect to the intermediate support members.

In a preferred embodiment of the invention, the panel is secured only to the longitudinal support members and, optionally, the transverse support members of the frame. Then, the panel is not secured to the intermediate

support members to facilitate flexing of the panel in a direction normal to the plane of the panel, in use.

The panel and the support structure may be of a resiliently flexible material. Thus, both the panel and the support structure may be of a synthetic plastics material such as polyurethane.

Preferably, the panel and the support structure are moulded. The panel may be bonded to the support structure.

For improving the rigidity of the support structure, at least certain, and preferably all, of the support members of the support structure may contain reinforcing elements.

The openings in the panel may be in the form of slots extending in a direction of flow of material over the panel, in use, each slot having a major, longer axis extending in the direction of flow of the material. Each slot may be substantially boomerang-shaped or chevron shaped and the slots may be arranged in rows with each row having an interrupted saw-tooth wave pattern in the panel extending in a direction of flow of the material.

The slots in each row may be oriented in the same direction such that apices or "elbows" of the slots point in the same direction. The slots in one row may be staggered with respect to the slots in an adjacent row and the slots in said one row may have their apices pointing in an opposite direction to the slots in the adjacent row.

Each slot may flare outwardly from an operatively top surface to a bottom surface of the panel.

According to a second aspect of the invention, there is provided a component for a screening panel assembly, the component including a screening panel having a plurality of generally boomerang-shaped or arcuate openings defined through it.

The openings may be in the form of slots extending, in use, in a direction of flow of material over the panel, each slot having a major, longer axis extending in the direction of flow of the material. The slots may be

arranged in rows in the panel with each row having an interrupted saw-tooth wave pattern extending, in use, in a direction of flow of the material.

The slots in each row may be oriented in the same direction such that apices or "elbows" of the slots point in the same direction.

5 The slots in one row may be staggered with respect to the slots in an adjacent row and the slots in said one row may have their apices pointing in an opposite direction to the slots in the adjacent row.

Each slot may flare outwardly from an operatively top surface to a bottom surface of the screening panel.

10 Brief Description of the Drawings

The invention will now be described by way of example with reference to the accompanying drawings in which:

Fig.1 shows a plan view of a screening panel assembly, in accordance with the invention;

15 Fig.2 shows a sectional side view of the assembly taken along line II-II in Fig.1; and

Fig.3 shows a sectional end view of the assembly taken along line III-III in Fig.1.

Specific Description of The Preferred Embodiment

20 In the drawings, reference numeral 10 generally designates a screening panel assembly in accordance with the invention. The assembly 10 includes a support structure in the form of a frame 12 on which a screening panel 14 is supported. Both the frame 12 and the panel 14 are of a synthetic plastics material, such as polyurethane.

25 The frame 12 and the panel 14 are both moulded or cast and the panel 14 is bonded to the frame 12 for use.

The frame 12 comprises a pair of transversely spaced, longitudinal members 16 and a pair of longitudinally spaced, transverse members 18. In addition, the frame 12 comprises a plurality of intermediate support members
30 or struts 20 extending parallel to the longitudinal members 16 and between the

transverse members 18. Thus, the struts 20 support the span of the panel 14 and the panel 14 rests thereon, in use.

However, the panel 14 is bonded only to the frame members 16 and 18 and is not bonded to the struts 20. In other words, the panel 14 only rests on
5 the struts 20 and is not secured in any way to the struts 20.

The members 16 and 18 and the struts 20 of the frame 12 include reinforcing elements 22 therein to improve the rigidity of the frame 12.

The panel 14 has openings or slots 24 defined through it from an operatively top surface 26 to a bottom surface 28 of the panel 14.

10 Each slot 24 is substantially boomerang-shaped having a major axis or length dimension L extending parallel to a direction of flow of material over the assembly 10, as illustrated by arrow A in Fig.1. Further, the slots 24 are arranged in rows 30. The slots 24 in each row 30 have their apices or "elbows" 32 pointing in the same direction. Further, the slots 24 in one row 30.1 have
15 their "elbows" 32 pointing in an opposite direction to the slots 24 in an adjacent row 30.2. The slots 24 in the row 30.2 are offset or staggered with respect to the slots 24 in the adjacent rows 30.1 and 30.3.

Due to the fact that the panel 14 is unsecured with respect to the struts 20 of the frame 12, when the assembly 10 is operated in use and is caused to
20 vibrate, the panel 14 reciprocates in the direction of arrows B (Figs. 2 and 3). Each time the panel 14 comes into contact with the struts 20, it is jolted which assists in displacing material which may have lodged in the slots 24. Due to the presence of bridging material 34 between adjacent slots 24 in each row 30, the panel 14 is sufficiently rigid to inhibit the passage of oversized material
25 through the assembly 10.

It is to be noted that each slot 24 has a width dimension W which is selected to determine the discriminating capacity of the panel 14 of the assembly 10. It is also to be noted that each row 30 of slots 24 effectively forms an interrupted sawtooth wave-like pattern of a predetermined amplitude
30 and wavelength.

The amplitude and wavelength of the wave pattern of each row 30 is selected in dependence on the required use of the assembly 10.

In addition, the shape of each slot 24 inhibits the likelihood of elongate oversized particles passing through the slots 24.

5 It is also to be noted in Figs.2 and 3 of the drawings that the slots 24 taper or flare outwardly from the top surface 26 to the bottom surface 28 of the panel 14 to enhance the passage of material through the panel 14 and to inhibit blockage or blinding of the slots 24 by the material.

10 It will be appreciated by persons skilled in the art that numerous variations and/or modifications may be made to the invention as shown in the specific embodiments without departing from the spirit or scope of the invention as broadly described. The present embodiments are, therefore, to be considered in all respects as illustrative and not restrictive.

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CLAIMS:

1. A screening panel assembly which includes
a support structure having a plurality of support members; and
a screening panel having a plurality of openings defined through it, the
5 openings being of a size which determines a discriminating capacity of the
panel and the panel being secured only to certain of the support members of
the support structure to facilitate flexing of the panel in a direction normal to a
plane of the panel.
2. The assembly as claimed in Claim 1 in which the support structure
10 includes a frame having a pair of transversely spaced, longitudinal support
members, a pair of longitudinally spaced, transverse support members and a
plurality of intermediate support members arranged between the longitudinal
support members and the transverse support members.
3. The assembly as claimed in Claim 2 in which the panel is secured to at
15 least one of the pair of longitudinal support members and transverse support
members but is unsecured with respect to the intermediate support members.
4. The assembly as claimed in any one of the preceding claims in which
the panel and the support structure are of a resiliently flexible material.
5. The assembly as claimed in any one of the preceding claims in which
20 the panel and the support structure are moulded.
6. The assembly as claimed in Claim 5 in which the panel is bonded to the
support structure.
7. The assembly as claimed in any one of the preceding claims in which at
least certain of the support members of the support structure contain
25 reinforcing elements.
8. The assembly as claimed in any one of the preceding claims in which
the openings in the panel are in the form of slots extending in a direction of
flow of material over the panel, in use, each slot having a major, longer axis
extending in the direction of flow of the material.

9. The assembly as claimed in Claim 8 in which each slot is substantially boomerang-shaped and the slots are arranged in rows with each row having an interrupted saw-tooth wave pattern in the panel extending in a direction of flow of the material.
- 5 10. The assembly as claimed in Claim 8 in which the slots in each row are oriented in the same direction such that apices of the slots point in the same direction.
11. The assembly as claimed in Claim 10 in which the slots in one row are staggered with respect to the slots in an adjacent row and the slots in said one
- 10 row have their apices pointing in an opposite direction to the slots in the adjacent row.
12. The assembly as claimed in any one of Claims 8 to 11 inclusive in which each slot flares outwardly from an operatively top surface to a bottom surface of the panel.
- 15 13. A component for a screening panel assembly, the component including a screening panel having a plurality of generally boomerang-shaped or arcuate openings defined through it.
14. The component as claimed in Claim 13 in which the openings are in the form of slots extending, in use, in a direction of flow of material over the
- 20 panel, each slot having a major, longer axis extending in the direction of flow of the material.
15. The component as claimed in Claim 14 in which the slots are arranged in rows in the panel with each row having an interrupted saw-tooth wave pattern extending, in use, in a direction of flow of the material.
- 25 16. The component as claimed in Claim 15 in which the slots in each row are oriented in the same direction such that apices of the slots point in the same direction.
17. The component as claimed in Claim 16 in which the slots in one row are staggered with respect to the slots in an adjacent row and the slots in said one

row have their apices pointing in an opposite direction to the slots in the adjacent row.

18. The component as claimed in any one of Claims 14 to 17 inclusive in which each slot flares outwardly from an operative top surface to a bottom surface of the screening panel.

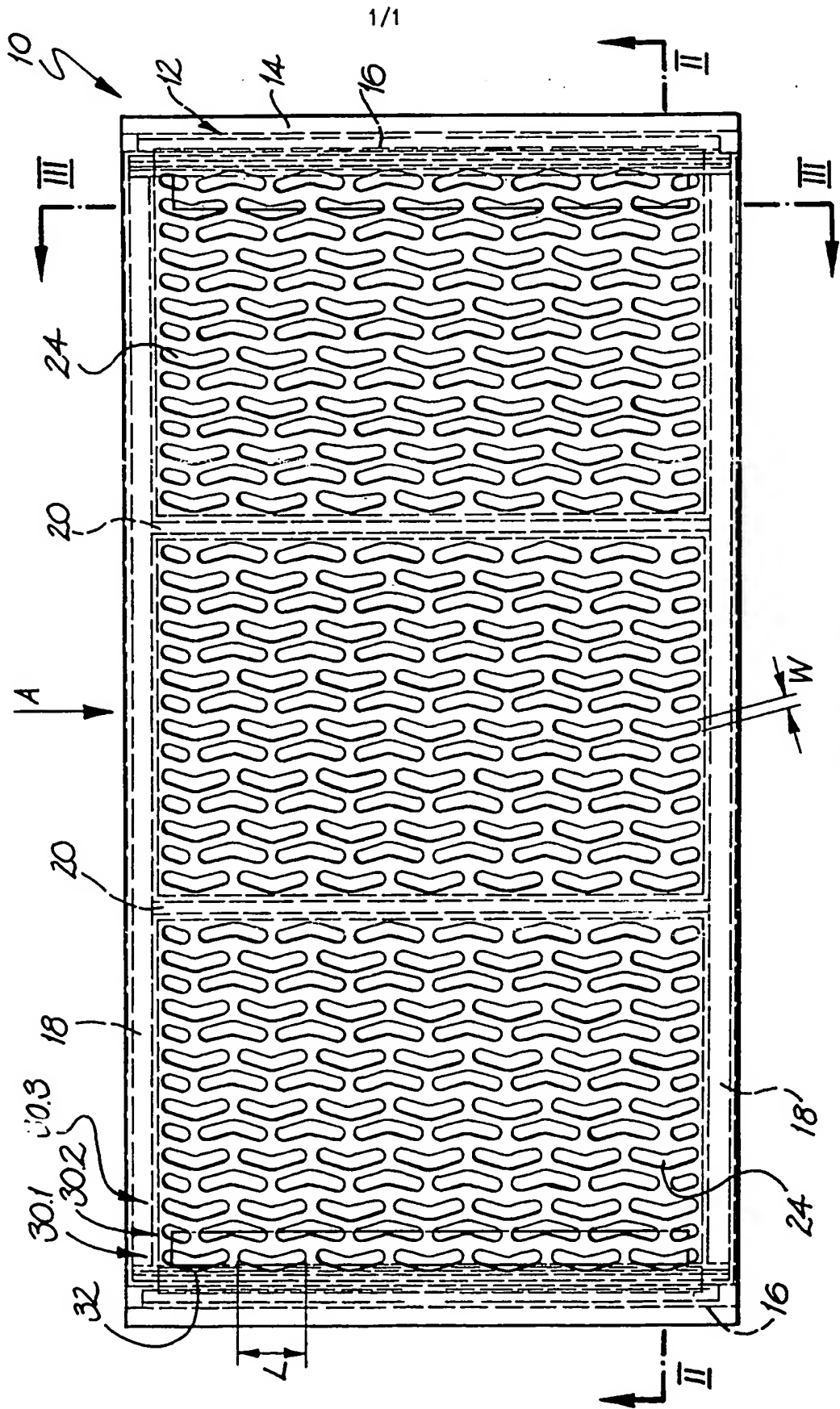
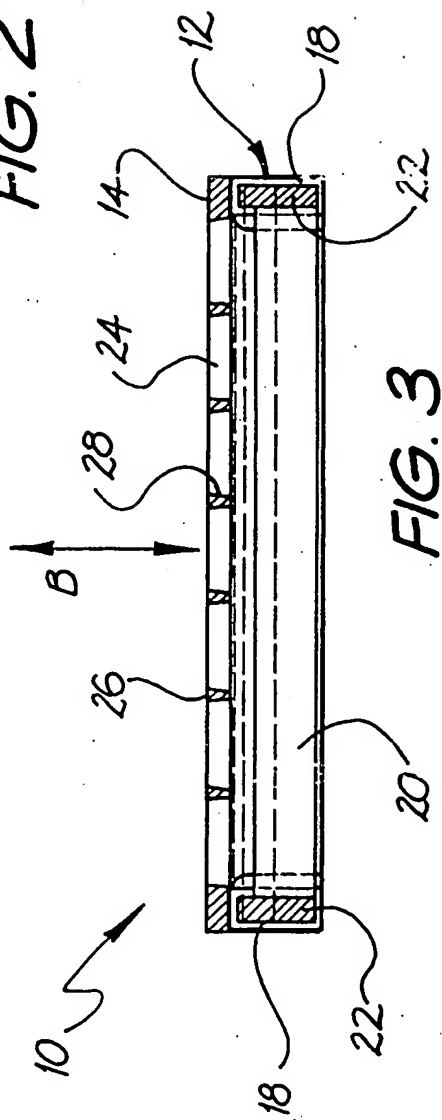
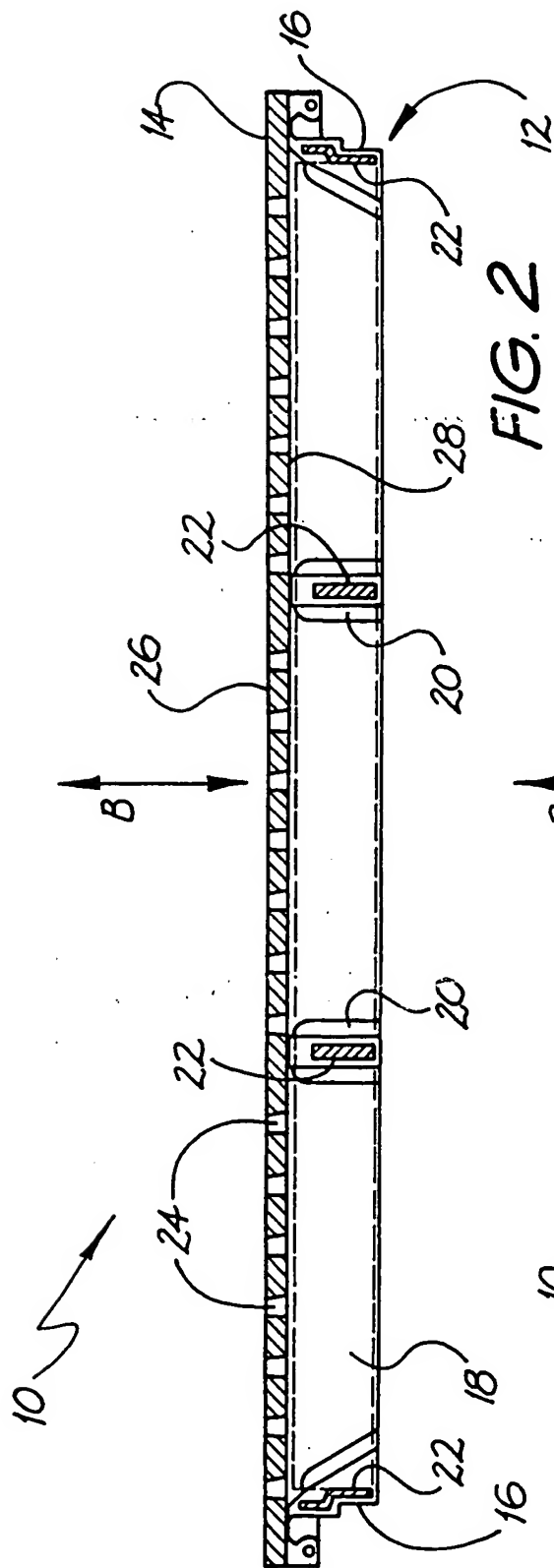
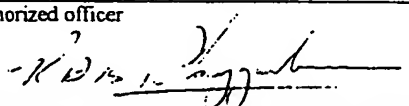


FIG. 1



INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU 00/00400

A. CLASSIFICATION OF SUBJECT MATTER												
Int Cl ⁷ : B 07 B 1/46, 1/04, 1/34												
According to International Patent Classification (IPC) or to both national classification and IPC												
B. FIELDS SEARCHED												
Minimum documentation searched (classification system followed by classification symbols) B 07 B 1/46, 1/04, 1/34												
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched AU:IPC as above												
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) WPAT: FLEX												
C. DOCUMENTS CONSIDERED TO BE RELEVANT												
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.										
X	EP 081471 A (TRELLEBORG AB) 15 June 1983 entire document	1-8										
X	AU 81139/87 (602023 B) (HEIN LEHMANN) 5 January 1989 entire document	1-8										
X	US 5876552 A (JOHN BAKULA) 2 March 1999 entire document	1-8										
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C <input checked="" type="checkbox"/> See patent family annex												
<p>* Special categories of cited documents:</p> <table border="0"> <tr> <td>"A" Document defining the general state of the art which is not considered to be of particular relevance</td> <td>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</td> </tr> <tr> <td>"E" earlier application or patent but published on or after the international filing date</td> <td>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</td> </tr> <tr> <td>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</td> <td>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</td> </tr> <tr> <td>"O" document referring to an oral disclosure, use, exhibition or other means</td> <td>"&" document member of the same patent family</td> </tr> <tr> <td>"P" document published prior to the international filing date but later than the priority date claimed</td> <td></td> </tr> </table>			"A" Document defining the general state of the art which is not considered to be of particular relevance	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention	"E" earlier application or patent but published on or after the international filing date	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone	"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art	"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family	"P" document published prior to the international filing date but later than the priority date claimed	
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Date of the actual completion of the international search 08 June 2000		Date of mailing of the international search report 27 JUN 2000										
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INTERNATIONAL SEARCH REPORT

International application No.

PCT/AU 00/00400

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	Derwent Abstract Accession No: 2000-115026/10, class P43, RU 2119833-C1, A (RES INTRODUCTION SERVICE CO LTD) 10 October 1998	1-8, 10
X	AU 77626/94 (682217) B (MANFRED FRANZ AXEL FREISSLE) 18 May 1995 entire document	1-4
X	AU 97218/98 (904990) B (USF JOHNSON SCREENS PTY. LTD) 4 March 1999 entire document	1-7, 8, 10
X	Derwent Abstract Accession No: 86-015312/03, Class P43, EP 167999 A (HEIN LEHMANN AG) 15 January 1986	1-8, 10

INTERNATIONAL SEARCH REPORT

International Application No.

PCT/AU 00/00400

Box I Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a)

Box II Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

Claims 1-12 are directed towards a screening panel assembly including a support structure with a plurality of support members and a screening panel having a plurality of openings.

Claims 13-18 are directed towards a component for a screen assembly including a screening panel having a plurality of boomerang-shaped or arcuate openings defined through it.

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims
2. ☒ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/AU 00/00400

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report		Patent Family Member	
EP	81471	AU	10160/83
		CA	1202602
		DK	2786/83
		ES	517937
		ES	8308232
		FI	831639
		NO	831442
		SE	8201272
		WO	83/02075
		ZA	8208835
AU	81139/87	DE	3721062
		EP	296273
		JP	1011679
		ZA	8708438
US	5876552	AU	60231/94
		AU	60844/94
		AU	65939/98
		CA	2152602
		EP	680385
		EP	680386
		WO	94/15723
		US	5417793
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		US	5720881
		US	5783077
		US	5868929
		US	5944993
		US	5958236

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Patent Document Cited in Search Report		Patent Family Member	
US	5876552	US	6000556
		US	6053332
AU	77626/94	ZA	9308237
AU	97218/98	46797/97	
			END OF ANNEX